HISTORY OF PHYSICS — M.L.G. REDHEAD

Syllabus:

Part I — Aristotelian Physics
A brief introduction.

Part II — The Scientific Revolution - Copernicus to Newton.
The principal figures to be discussed include: Copernicus, Galileo, Kepler, Gilbert, Bacon, Descartes, Hooke, Huyghens, Boyle and Newton.

Part III — 19th Century Physics to 1870.
Three principal themes will be considered, the concepts of Energy, Atom and Field. These will lead to a study of the development of thermodynamics, the kinetic theory of gases, and the theory of the electromagnetic field.

The principal figures to be discussed include: Joule, Clausius, Helmholtz, Kelvin, Maxwell, Young, Fresnel and Faraday.

Individual projects in the history of modern physics (1870-1980) by arrangement.

General Background Reading

A. Pannekoek	A History of Astronomy (1961)
C. Singer	A Short History of Scientific Ideas to 1900 (1959)
A.R. Hall	The Scientific Revolution (1954)
H. Butterfield	The Origins of Modern Science (1949)
E. Burtt	The Metaphysical Foundations of Modern Science (1925)
T. Kuhn	The Copernican Revolution (1957)
R. Westfall	The Construction of Modern Science (1971)
A. Koestler*	The Sleep Walkers (1959)
D. Cardwell	Technology Science and History (1972)
C. Gillispie	The Edge of Objectivity (1960)
R. Lindsay (ed)	Energy: Historical Development of the Concept (1975)
R. Lindsay (ed)	Early Concepts of Energy in Atomic Physics (1979)
M. Hesse	Forces and Fields (1961)
L. Pearce-Williams	The Origins of Field Theory (1966)
W. Berkson*	Fields of Force (1974)
S. Brush	The Kind of Motion we Call Heat (1976)
Y. Elkana*	The Discovery of the Conservation of Energy (1974)
J. Losee	A Historical Introduction to the Philosophy of Science (1972)
G. Holton & D. Roller	Foundations of Modern Physical Science (1958).

Note: Books marked with an asterisk should be read with particular critical caution.

Essay Topics on the History of Physics

1. The Aristotelian Conception of Nature.
2. The Copernican Revolution.
3. The Contribution of Galileo OR Bacon to scientific method.
4. Kepler's role in the development of 17th century science.
5. The rise and fall of Cartesianism.
6. 17th Century Corpuscularianism.
7. Gilbert - First of the Moderns or last of the Ancients?
8. The Idea of Universal Gravitation in the 17th Century.
9. Newton versus Leibniz on the nature of space and time.
10. Newton's contribution to physical optics - an assessment.
11. The objections to Newtonianism - An assessment of Berkeley's 'de Motu'.
12. The rise of the kinetic theory of gases - Herapath to Maxwell.
13. The discovery of the conservation of energy.
14. Faraday's contribution to the notion of the electromagnetic field.
15. The development of Maxwell's electromagnetic field theory.
16. The interaction of science and technology in early 19th century physics with special reference to the work of Carnot.
17. The history of the 2nd law of thermodynamics.
18. The rise of the wave theory of light - Young and Fresnel.
19. The pressure of light - a vascillating crucial experiment.
20. The notion of the chemical atom - Dalton to Kekulé.